



Program Report 2020-2022

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Health Impacts of KDD

From 2020 to 2022, 134 participants in the Kentucky Double Dollars (KDD) program completed an impact survey. Overall, participants found this program to have wide-ranging impacts. In what follows, we first detail the extent to which behavior and perception changes were observed by participants. We then identify specific factors that help understand whether a participant is more likely to experience certain behavior and perception changes.

All respondents except two (99%) noticed positive changes in at least one of the seven food related behaviors we measured. Ninety-five percent (95%) experienced positive changes in three or more of the behaviors measured. Eighty-five percent (85%) reported that they had positive changes in five or more of the behaviors measured. Forty-nine percent (49%) reported positive changes in all seven behaviors.

Table 1 provides a breakdown of the percentage of respondents stating that they have observed major changes, some changes, and no changes in the following behaviors.

Table 1. KDD Participant Behavior Changes

	Major Change	Some Change	No Change
Increased physical activity	19%	62%	19%
Less Consumption of Processed Foods	37%	54%	9%
Weight Loss	11%	53%	36%
Better digestive health	21%	61%	17%
Better food preparation skills	25%	49%	26%
Greater nutritional awareness	31%	49%	20%
Greater awareness of food sources and farming	47%	42%	11%

If both positive change categories are combined, participants observed the following changes in order of frequency:

- Less Consumption of Processed Foods: 91%
- Greater awareness of food sources and farming: 89%
- Better digestive health: 82%
- Increased physical activity: 81%
- Greater nutritional awareness: 80%
- Better food preparation skills: 74%
- Weight Loss: 64%

The awareness of food sources and decreased consumption of process foods were the largest behavioral impacts. Respondents learned about their foods in ways that also lead to better food preparation skills (i.e. cooking meals) and knowledge about nutritional aspects of foods. A large majority of respondents felt they had better digestive health and even became more active. Finally, a majority of participants noticed some degree of weight loss. The impact on the KDD program on behavior change is comparable to other nutrition incentive programs in the same region such as Community Supported Agriculture (CSA) vouchers (see Rossi et al. 2017).

KDD contributed to increased household consumption of fresh fruits and vegetables. Eighty-eight percent (88%) of respondents agreed or strongly agreed that the KDD increased their vegetable intake. Eighty-two percent (82%) agreed that KDD increased their fruit consumption. Despite these positive changes, 68% of respondents did not participate in any consumer education programs – including nutrition, food preparation, and SNAP programs. Participation in these programs could help reinforce healthy behavior changes – which is something we illustrate next. Perhaps increasing the opportunities or incentives for participation would also increase market visitation and KDD usage. It should also be noted that the participation in supplementary programs was very low in the 34 observations gathered during the first pandemic year (2020), perhaps due to COVID-induced social distancing practices.

Modeling Factors of KDD-Related Behavior Change

In this section, we present results from ordered logistic regression models. Our goal is to identify which variables are most important in predicting whether an individual perceives a positive behavior change.

To do this, we used survey responses from each of the behavior change variable and regressed them using the following independent variables:

- FM Visits = Visits to the farmers market during that KDD season (continuous)
- Food Ed = Participation in consumer food education programs (no participation, participation once, and participation multiple times)
- KDD Exp = Number of years participating in the KDD program
- Food Insecurity = Agreement with the question “In the past 12 months, the food that we bought just didn't last, and we didn't have money to get more.” (1=Strong disagree, 5=strong agree)
- KDD Veg Intake = Agreement with the question “Because of my participation in the Kentucky Double Dollars program, I eat more servings of vegetables than I did before getting into the program.” (1=Strong disagree, 5=Strong agree)
- Age = Age (Categorical by generation)
- HH Size = Household Size (Number of Dependents)

In **Table 2**, the percentages represent increase in likelihood of a positive behavior change if the values of each variable are higher. We only include percentages for variables that show a statistical likelihood of impacting behavior changes.

Table 2. Variables that Increase Likelihood of Behavior Change

	FM Visits	Food Ed	KDD Exp	Food Insecurity	KDD Veg intake	Age	HH size
Increased physical activity		11%			8%		
Less Consumption of Processed Foods					9%		
Weight Loss		15%			9%		
Better digestive health		14%			12%		
Better food preparation skills		17%			12%		7%
Greater nutritional awareness		16%			15%		
Greater awareness of food sources and farming		10%			23%		10%

A few results stand out here. First, if an individual participated in a food education program, they were more likely to have positive changes in all behaviors except for processed food consumption. For instance, if an individual attended a class, they were 17% more likely to give a positive response to recently gaining food preparation skills, and about 15% more likely to experience weight loss, have better digestive health, and/or have greater nutritional awareness. This variable also increased the likelihood one would perceive greater physical activity. Given that two thirds of participants did not attend supplementary programming, this is one area where the KDD program might encourage more participation – since it seems to enhance the impact of KDD. In a separate study on CSA incentive programs, we identified participation in consumer food education programs to be a critical factor in perceived benefits of CSA vegetable box subscriptions (Rossi & Woods 2020).

Additionally, if an individual agreed that the KDD was responsible for increasing their vegetable consumption, they were also more likely to have positive changes in all measured behaviors. While not surprising, this is encouraging, especially since 88% of all participants observed increases in vegetable consumption. On its own, the value of the KDD is that it increases vegetable consumption, and vegetable consumption is perceptually linked with many other positive behavior changes.

Since vegetable consumption is a critical variable in predicting behavior change, it is worth wondering what variables might increase an individual's likelihood of improving vegetable consumption. To answer this question, we conducted a regression on the Veg Intake variable (as well as the KDD Fruit Intake variable) using the same variables as above.

Table 3. Variables that Increase Likelihood of Increased Fruit and Vegetable Intake

	FM Visits	Food Ed	KDD Exp	Food Insecurity	Age	HH size
KDD Veg intake				8%		
KDD Fruit intake		12%		10%		

In **Table 3**, number of visits to the market and experience in the KDD program did not have an impact on behavior changes. Similarly, these variables have little predictive power on whether an individual increase vegetable or fruit intake. It is important to note that visits and experience do not negatively impact behaviors, they just do not explain any changes in behavior. In other words, once a person is enrolled in the KDD (as long as they use their benefits at least once), they are likely to experience some positive benefits.

What is more striking here is the significance of the food insecurity variable. The more strongly a person agreed with the question “In the past 12 months, the food that we bought just didn't last, and we didn't have money to get more”, the more likely they were to have increased their vegetable and fruit consumption once enrolled in the KDD program. In other words, individuals who perceived themselves to be more food insecure were more likely to perceive the KDD to increase their fruit and vegetable consumption. Now it is unclear whether the KDD improved accessibility and/or affordability of healthy farm products because we did not ask this specifically. However, the significance of the food insecurity question indirectly suggests that the KDD does improve fresh food consumption in a very meaningful way.

Sixty-four percent (64%) of participants visited their farmers markets more than 9 times per year in 2020, 2021, or 2022 with 45% visiting at least 12 separate times. The average number of visits to the farmers market per person was 10 times per year. Eighty-six percent (86%) of respondents spent all \$12 of their vegetable incentives each time they visited. Seventy-two percent (72%) used all \$8 of their meat incentives. Fifty-seven percent (57%) of respondents mentioned that they have been involved with the KDD program for at least one year. This frequent usage of the market indicates that they were compelled to use their KDD benefits and acquire fresh foods. SNAP, KDD, and other benefits are creating ongoing engagement with the markets for these recipients.

COVID may play a part in this motivation to access fresh foods via the farmers market. Approximately 54% of the respondents said that COVID made it more difficult to access fresh and healthy foods. Yet, 82% of respondents said they began visiting farmers markets more often. This percentage was significantly more than all other market channels that we measured including retail, super stores, food pantries, direct farm purchases, and convenience stores. It is possible that farmers markets, incentivized by KDD, provided a viable outlet for meeting food needs during a time of crisis. This reflects national trends where at least 1/3 of consumers visited a new local/regional food business or market channel during the first 6 months of COVID (Thilmany et al. 2021).

At the same time, two-thirds of farmers markets nationally indicated that they lost revenue in 2020 compared to 2019 (Rossi, Zare, & Woods 2022). As such, farmers markets have had challenges increasing or maintaining sales during COVID, but as we discuss below, over half of the vendors in Kentucky in farmers markets with KDD (who provided responses to this survey) either maintained or increased sales overall during this same time. The majority saw increases in sales related to the KDD program. The KDD program seems to have provided both consumers and producers in Kentucky with an important safety net during this time of uncertainty.

Economic Impacts of KDD

We estimated economic impacts of the KDD program for participating farmers using post-season surveys.

- Of the 150 farmers providing full survey responses, 120 (80%) attributed sales increases at farmers markets to the KDD.
- Nine farmers did not know if sales increase were because of KDD (6%).
- Of the 21 farmers who said KDD did not increase sales (14%), 14 reported that sales increased or stayed the same during COVID.
- The breakdown of these farms in total farm income (prior to the KDD program) is 111 with \$15K, 29 with \$60K, 4 with \$175K, and 4 with over \$600K.
- The initial sales for all farms at farmers markets combined was about \$3,024,000. Following participation in the KDD program, farmers market sales were estimated at \$3,285,000. This represents a total increase of \$260K and a \$2K (+9%) increase per farm, including farms who lost farmers market sales due to COVID.

When broken down by initial farm income, a slightly different picture emerges. These differences are because of the prevalence of smaller farms.

- For the \$15k farms, 85 reported gains in sales due to KDD. 22 did not see gains.
 - These smaller farms had an average of \$10K in annual farmers market sales prior to the KDD program.
 - The total increase in farmers market sales due to KDD was ~\$111K.
This is estimated to be ~\$1K increase in farmers market sales per farm (+9%).
- For the \$60k farms, 25 farmers reported gains in farmers market sales due to KDD. Four did not see gains.
 - These small to medium sized farms had an average of \$40K in annual farmers market sales prior to the KDD program.
 - The total increase in farmers market sales was \$81K.
 - This is estimated to be a \$3K increase in farmers market sales per farm (+7%).
- All \$175k farms (N=4) reported gains in farmers market sales due to KDD.
 - These medium-sized farms had an average of \$65K in annual farmers market sales prior to the KDD program.
 - The total increase in farmers market sales was \$10K.

- This is estimated to be a \$2.5K increase in farmers market sales per farm (+4%).
- All >\$600K (N=4) farms experienced increases in sales at the farmers market due to KDD.
 - These large farms averaged \$100K in annual farmers market sales prior to the KDD program, the total increase in farmers market sales was \$55K. This is estimated to be a \$13K increase in farmers market sales per farm (+13%).

For further context, the 122 farmers who said that the KDD program increased farmers market sales saw an average 12% increase. Sixty-eight percent (68%) of respondents answered that KDD increased farmers market sales by at least 5%. Thirty-nine percent (39%) and 12% of respondents increased sales by more than 10% and 20%, respectively.

We also asked farmers whether the KDD program increased 1) their net farm income, 2) product diversification at farmers markets, and 3) on-farm employment.

Seventy-six percent (76%) of respondents agreed that participation in KDD increased farm income overall.

- For the \$15K farms, 81% reported gains in net farm income due to KDD.
- For the \$60K farms, 70% reported gains in net farm income due to KDD.
- All \$175K farms reported gains in net farm income due to KDD.
- All >\$600K farms experienced gains in net farm income.

Half (50%) of farmers – regardless of size class - indicated that they increased the number and type of products offered at the markets. Thirty-six percent (36%) of farmers increased employment due to the KDD program. In short, the KDD had diverse, positive impacts on farms. While these impacts were experienced the most by smaller producers – all size classes saw benefits.

COVID Impacts

COVID provides an additional context to the previous responses about KDD's economic impact. As the pandemic disrupted the timing and structure of the market experience, it impacted vendors differently. During 2020, 51% of farmer respondents reported increases in farmers market sales during COVID compared to the previous year, 20% saw no change, and 29% reported decreases. For those who indicated decreases, the average decrease was 34%. For those who observed increases, sales increased by 24% on average.

In 2021 and 2022, 36% of respondents reported increases in farmers market sales compared to the previous year, 31% saw no change, and 33% reported decreases. For those who indicated decreases, the average decrease was 31%. For those who observed increases, sales increased by 21% on average.

It is possible to read these data as an indication that those who experienced sales increases due to COVID in 2020 maintained or increased sales in 2021 and 2022. In other words, the COVID experience, paired with KDD benefits, potentially increased the consumer base for farmers markets and other direct sales to farmers. The majority of farmers surveyed reported sales increases at both farmers markets and direct retail venues due to COVID. In contrast, they saw decreases at all other market channels – including retail, restaurants, wholesale, and emergency food. So despite the diverse effects of COVID, farmers viewed the KDD as having an important positive impact on sales.

Additionally, we developed a multinomial logit model to predict the likelihood that a farmer would report one of three sales outcomes: 1) decreases in farmers market sales due to KDD, 2) no change in farmers market sales due to KDD, and 3) increase in sales due to KDD. We evaluated these outcomes using the following variables:

- # FMKTs = number of farmers markets a farmer sold at during the market season. (continuous)
- Farm Size = Annual farm income. (categorical – same size classes as above)
- FMKT % = Percentage of overall farm sales occurring at farmers markets. (continuous)
- Year = Year the farmer evaluated KDD impacts.
- COVID = How did COVID impact sales at farmers market? (categorical - ordered)

Table 4. Variables that Predict Likelihood of Different Sales Outcomes

	# FMKTs	FMKT %	Farm Size	Year	COVID
Farm Market Sales Decrease					-32%
Farm Market Sales No Change					
Farm Market Sales Increase				-12%	32%

Table 4 shows that farm size, percent of sales at farmers markets, and number of farmers markets do not predict whether a farmer might have changes in sales at farmers markets due to KDD. However, if a farmer indicated that they increased sales at farmers market due to COVID, they are 32% more likely to answer that KDD increased their farmers market sales. Additionally, they were 12% less likely to see increases (compared to the previous year) during the 2021 and 2022 market seasons. These results may indicate that the combination of COVID-related food insecurity and the expansion of KDD in 2020 lead to new market patrons and increased sales during that year. Many of these individuals may have continued shopping at farmers markets in subsequent years, but others may have become more willing to revisit mainstream shopping venues such as superstores and retailers.

Other data may support this conclusion. Nationally, SNAP-related FM programs were critical to market revenues during COVID. Using a national dataset of 420 farmers market managers in all 50 states and D.C., we identified increased SNAP sales as the most important variable in predicting whether a FM maintained or increased revenue during the first pandemic market

season in 2020 (Rossi, Zare, & Woods, 2022). While we considered other variables such as COVID incidence rate, years of market operation, state guidelines for FM to operate during COVID, and access to technical assistance, SNAP sales increases appeared to improve the revenue outcomes of FM organizations and their vendors. As such, SNAP and other nutrition incentive programs seem to provide multiple benefits during a time of unprecedented crisis: improved FM sales, expanding fresh food access, and providing a social outlet for patrons.

KDD Farmer Impact Conclusions

Returning to KDD, farmers had a strongly positive view of the program. Eighty-four percent (84%) of farmers were satisfied or extremely satisfied with the KDD program. One farmer expressed slight dissatisfaction. This question included farmers who did not think that KDD increased sales in any way. Most perceived KDD to increase sales at farmers markets, even with a challenging and uncertain pandemic that disrupted sales in many market channels. One consideration is that the pandemic created many new users of KDD due to economic hardship. More potential participants may have contributed to increased sales in 2020-22. Some of these individuals may be short-term users of KDD, but the results above indicate that some consumers may become longer-term visitors to the markets – even after the need for KDD benefits expires. As such, there may be a longer-term positive impact of KDD on market sales that will be unmeasurable.

Finally, 53% of respondents expected to increase production to meet increased demand at farmers markets. An additional 26% are considering expansion. Twenty-six percent (26%) of farmers expected that they would hire at least one additional worker. Ten percent (10%) said they would likely hire 2 or more workers. In short, the KDD program's benefits appear critical to both farmers and recipients – especially in a pandemic that created many food access issues.

Social Impacts

We held one in-person discussion with 5 KDD and senior voucher participants in Louisville in 2021. We had planned to have 4-6 total focus groups with KDD participants, but COVID created significant challenges to organizing group discussions in person. Additionally, participant access to reliable internet made virtual focus groups difficult. As such, we present a few insights from our discussion in Louisville.

Participants were extremely appreciative of the KDD program. First and foremost, the KDD and senior voucher benefits provided an incentive for participants to visit the market. A few participants had never been to the market before, as the perceived cost of items was high. The combination of SNAP and doubling made the cost reasonable and sometime less expensive than conventional retailers, especially for organic items.

Participants noted that they were eating more and different vegetables than when the market is not open. They also said that they cooked a lot more often during the market season and were eating less processed (junk) food. With semi-regular visits, they were eating more vegetables

(especially green and red items) when the market was open. They were learning how to prepare vegetables in many different ways. This helped them progressively avoid food waste – which was very important to all participants.

The benefits made trying a novel vegetable more palatable. Farmers were very helpful in suggesting different preparation methods for unfamiliar items. They could also try small amounts of different vegetables prior to buying, so novel items would be more familiar. Being able to sample new vegetables and varieties made it easier to justify spending money on these same things at grocery stores when not in season. However, they did note that the store-bought items are generally more disappointing compared to what they would get at the market. The market items are perceived as tastier, better quality, and more flavorful. The KDD program is broadening vegetable consumption to the point where participants will look for similar items in the grocery once the market season is finished. But at the same time, the participants become more aware that the fresher, seasonal vegetables from local farmers offer may be better quality than grocery store items.

Farmer interactions seemed to be a highlight for the participants. Once they build a rapport with different farmers, participants are more comfortable with the overall market experience. Participants and this market appreciated their interactions with farmers because they said that the farmers really built trust by offering high-quality items, throwing in some bonus items, and offering advice and information on new varieties. These interactions are critical because participants then tell their friends and associated communities about the farmers market and the various benefits programs.

The participants learned about the market and the KDD program from very different sources including local signage, Facebook posts by the market manager, word of mouth from friends/family, participation as a foster parent, TV ads, news coverage about the market, and community center communications. It is difficult to recommend a specific marketing approach to reach new eligible KDD recipients since their methods are so varied. The participants did say that they often just happened upon the opportunity – and sometimes the signups for the benefits were not convenient. They said that you had to do this in person at very few available locations, so increasing access to signup opportunities will help reach more people. It is possible that COVID has impacted these processes – but it is worth considering how to make this easier for potential recipients. The participants said more people would seek out the KDD and senior voucher benefits if they knew about them, and knew how to get them.

There are significant structural issues that are not market specific – including lack of reliable internet and transportation access – that hinder KDD signups and marketing. Improving bus services to market locations, and in general, at lower cost would help folks get to the market. This is important since retail grocery delivery costs extra (or doesn't exist) and is not covered by SNAP.

Finally, the markets were really important venues for social interaction, especially during COVID. Having a safe outdoor space for social interaction was important to the participants, especially since many were seniors, and their normal locations for interaction (churches, bingo

halls, libraries, etc.) were closed during long stretches of the pandemic. The market was one piece of former life that remained. The market manager discussed how one family valued the market and the KDD program because it was one place where their autistic child felt confident and social. The markets serve many roles – and the KDD program is improving participation and access to fresh, local, quality produce.

Key Insights

- KDD and other SNAP-related programs are beneficial to participants once they are enrolled in the program. Participants cook more often, consume more fresh vegetables, and learn about new types of produce. With positive experiences, they spread the word of these opportunities to family, friends, and community members.
- It is important that vendors are not pushy – the experience of a farmers market can be intimidating to some folks, so having interactions that are participant-directed are critical. If farmers appear to be very patient and supportive of each other, visitors can have a comfortable, inviting experience.
- Farmers markets should focus on creating a comfortable experience for EBT processing. One participant noted that they would like to buy fresh vegetables at certain retailers that specialize in healthy foods, but that the process for redeeming benefits can be somewhat embarrassing. Farmers markets can be more comfortable spaces if they have an efficient system for processing and distributing SNAP, KDD, and senior vouchers, as well as farmers who are willing to work with beneficiaries.
- Expand efforts to make sign-ups easier for eligible participants. Participants often have a difficult time finding out about KDD and other benefits – and this is compounded by lack of opportunities to sign up for the benefits. More consideration of outreach and marketing might help, though broader infrastructural/structural issues make this a challenge. Advocates who know the particular barriers and social networks of a place can help develop a diverse outreach strategy.
- KDD is associated with improved healthy behaviors in both focus group discussion and in participant surveys. The vast majority of participants only see positive changes and benefits from their participation. While it is more difficult to quantify the specific health impact without access to sensitive health records and the ability to conduct a controlled experiment, most individuals feel that the program is improving their food consumption habits. Focus group participants mentioned that their A1C goes down during the market season.
- Farmers market vendors associate the KDD program with increased market sales, even during the pandemic. As most vendors are smaller-scale farmers, KDD helps stabilize or augment their overall farm revenue.
- Both farmers and participants have a positive opinion of the KDD program.
- Farmers markets have diverse social, economic, and health impacts. Some of these are quantifiable, others less so. What is clear is that farmers markets were extremely important during COVID since they provided a safe food acquisition experience as well as a space for social interaction. It helped stabilize or even increase market vendor revenue during the pandemic. KDD and other incentive programs only increase the possibility that individuals visit the markets and support Kentucky farmers.

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